Universidad Zaragoza

Academic Year/course: 2024/25

25869 - Physics II

Syllabus Information

Academic year: 2024/25
Subject: 25869 - Physics II
Faculty / School: 110 - Escuela de Ingeniería y Arquitectura
Degree: 558 - Bachelor's Degree in Industrial Design and Product Development Engineering
ECTS: 6.0
Year: 1
Semester: First semester o Second semester
Subject type: Basic Education
Module:

1. General information

The subject Physics II presents the conceptual foundations of electricity, magnetostatics, electromagnetism, and wave phenomena. Therefore, it provides the physical foundation for various mandatory and elective courses in the degree program.

Although not strictly required, it is recommended to have completed the subjects "Physics and Chemistry" and "Physics" in high school, as well as to be proficient in the following mathematical tools:

- Complex numbers
- Trigonometry
- Analysis of elementary functions
- Differentiation and integration of functions of one variable

2. Learning results

In general, it is expected that by the end of the course, each student will:

1. Understand the fundamental concepts and laws of fields, waves, and electromagnetism and correctly apply them to basic engineering problems.
2. Analyze problems that integrate different aspects of Physics, recognizing the various physical foundations underlying a technical application, device, or real system.
3. Know the units and orders of magnitude of the defined physical quantities and solve basic engineering problems, expressing the numerical result in the appropriate physical units.
4. Correctly use basic experimental measurement or simulation methods, and process, present, and interpret the obtained data, relating them to the appropriate physical quantities and laws.
5. Use bibliography through any of the currently available means and use clear and precise language in their explanations on Physics issues.

These general outcomes should, in turn, be concretized into more specific achievements. Thus, it is expected that each student will:

1. Understand the main properties of electric and magnetic fields, the classical laws of electromagnetism that describe and relate them, their meaning, and their experimental basis.
2. Know and use concepts related to capacitance, electric current, self-induction, and mutual induction, as well as the electrical and magnetic properties of materials.
3. Understand the wave equation, the characteristic parameters of its basic solutions, and their energetic aspects.
4. Analyze the propagation of mechanical waves in fluids and solids and understand the fundamentals of acoustics.
5. Recognize the properties of electromagnetic waves, the basic phenomena of propagation and superposition, the electromagnetic spectrum, the basic aspects of light-matter interaction, and the applications of these phenomena in technology.

3. Syllabus

Part I (Electricity)

1. Electrostatic field and potential.

2. Gauss's Law.

3. Electrostatic field in the presence of conductors.

4. Electrostatic field in the presence of dielectrics.

5. Electric current.

Part II (Magnetostatics)

6. Magnetic induction, B.

7. Ampère's law in vacuum.

8. Magnetostatic field in the presence of matter.

Part III (Electromagnetism)

9. Electromagnetic induction.

10. Maxwell's equations.

Part IV (Waves)

11. Wave motion.

12. Wave superposition.

13. Acoustics.

4. Academic activities

Lectures: 50 hours
Presentation of course content and problem-solving on the board.

Laboratory sessions: 10 hours
Experimental demonstration of some of the physical phenomena studied in the course.

Personal study: 84 hours

Assessment tests: 6 hours

5. Assessment system

A continuous assessment system, which will be carried out throughout the learning period. Thus, the final grade for the course is obtained from:

1) Two intermediate midterm tests, consisting of the resolution of short questions and problems. Each one accounts for 40% of the total grade.

2) Laboratory sessions, which account for 20% of the total grade. They are evaluated on the basis of questionnaires given to at the end of each session. The total grade is the average of all the questionnaires, provided that all sessions are attended.

In order to pass the subject, it is necessary to obtain at least 5 points out of 10 in the final grade resulting from all the tests, **in addition to a minimum score of (a) 4 points out of 10 in each of the partial tests and (b) 5 points out of 10 in the laboratory practicals**. If conditions (a) and (b) are not met, the maximum grade that can be obtained is 4.6 points out of 10 (Fail).

Students who do not pass the subject through the continuous assessment system, or who wish to improve their grade, may take a global test, the date of which will be established in the academic calendar. It will consist of:

1) A written test with a structure analogous to that of the intermediate tests (up to 80% of the total grade, depending on the part of the grade already obtained that is used).

2) A practical laboratory exam, in which one of the proposed practices must be completed individually and without the teacher's help (20% of the total grade).

The conditions to pass the subject through the global test are identical to those of the continuous assessment.

Exceptionally, due to a legally recognized force majeure and after individual evaluation of the case by the University Office for Diversity Services, the practical laboratory exam in the global assessment may be replaced (with the same weight in the grade) by the submission of a written paper that demonstrates the achievement of general learning outcome 4 of the course.